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ABSTRACT

This Child Development Associate (CDA) training module, one of a series of 18, provides a guide to science activities for preschool children. Objectives state that upon completion of the module the CDA trainee will be able to provide daily opportunities for science concept development; enhance children's problem solving abilities; stimulate creative thinking and problem solving through discovery learning; provide a science center; plan, execute and evaluate a minimum of 10 learning experiences in the biological and physical sciences; execute and evaluate five incidental science experiences; and expand the science experiences to include all sciences, such as hydrology, botany, chemistry and physics. Early sections of the module define terms and suggest a procedure by which trainees can evaluate their strengths and weaknesses. Subsequent chapters discuss the teacher's responsibility for science in the preschool, teaching science in the preschool, and activity development. The module also provides 15 learning activities, ranging from resource unit development to constructing a terrarium. Supplemental reference books, pamphlets, films, and children's books are listed. (RH)

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CHILD DEVELOPMENT ASSOCIATE

PS 011439

Conceptual Science: From Atoms to Galaxies

OKLAHOMA C.D.A. ADVISORY COUNCIL AND OSCAR ROSE JUNIOR COLLEGE

CHILD DEVELOPMENT ASSOCIATE

The Child Development Associate Pilot Project, funded by the U. S. Department of Health, Education and Welfare, Region VI, Office of Child Development, was awarded to Eastern Oklahoma State College in the fall of 1973, where during the next two years, draft materials for competency-based training was developed. In the fall of 1975, Oscar Rose Junior College was contracted to review and revise the materials for publication. The following individuals have provided the expertise and assistance for completion of the Oklahoma Child Development Associate curriculum materials.

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CHAPTER I

INTRODUCTION

RATIONALE

Science study comes naturally to young children as they are active, curious, and enjoy manipulating and experimenting with objects. They are constantly asking questions of discovery---when, how, where, and why?

The approach to teaching science is through "process." It offers children the opportunity to participate in the processes of science such as inquiry, discovery, and exploration; and to begin to develop skills of observation, description, problem solving, classification, relationships, logical reasoning, and inferring.

All children must be allowed to progress at their own rates---from concrete learning or facts, to concepts and then abstract generalization. They cannot be rushed; understanding will evolve more easily with the provisions of a variety of materials and experiences with which they can be involved.

Learning experiences for children must take into account the various environments of the children and relate unknown concepts through known cues.

Incidental learning activities arise frequently when working with young children. The perceptive teacher will follow these opportunities with further experiences and promote the seeking of answers in the children.

Accomplishment of the objectives in this area will foster the individual's development of the following competencies as defined by the Child Development Associate Consortium:

Competencies:

II. Advances physical and intellectual competence.

III. Builds positive self-concept and individual strength.

IV. Promotes positive functioning of children and adults in a group.

OBJECTIVES

Upon completion of this area the trainee will be able to:

1. Demonstrate the importance of science in the curriculum of young children by providing opportunities daily for science concept development.

2. Demonstrate the ability to develop problem solving abilities in children by asking questions and providing experiences for answering the questions.

3. Stimulate creative thinking and problem solving in children through activities that lead to discovery of something new or an answer.

4. Provide a science center with equipment and materials to stimulate exploration and investigation of science concepts.

5. Plan, execute, and evaluate a minimum of ten learning experiences in science; five in biological science and five in physical science.

6. Expand the science experiences to include learnings in all areas of science; for example: hydrology, botany, chemistry, physics, etc.

7. Execute and evaluate a minimum of five incidental science experiences with young children.

CHAPTER II

DEFINITIONS OF TERMS

1. Biological science---The study of living things.

2. Energy---Most basic source that makes up both non-living and living things.

3. Experiment---An organized method of problem solving planned to test, try out ideas, and to help the child come to accurate conclusions.

4. Key concepts---Basic fact in a given area.

5. Matter---Anything that has weight or takes up space.

6. Physical science---The study of non-living things.

7. Science---The organized study of things around us.

8. Science of earth and universe---The study of the components of the earth and natural phenomena surrounding our earth.

9. Science of man and his environment---The study of how people adapt to work with elements in their environments for more comfortable, effective lives.

10. Scientific method of problem solving---A sequence of steps used to solve a problem.

CHAPTER III

SELF-EVALUATION

To determine your competence in this area, read through the rationale and objectives in Chapter I and check those which you can perform successfully. This will provide an indication of your strengths and weaknesses.

Discuss this evaluation with the trainer/supervisor to determine the classroom and field experiences that will enable you to demonstrate competence in each objective.

If your self-evaluation and interview indicate that you can demonstrate competence in each objective, request an advanced-standing examination from your trainer.

CHAPTER IV

TEACHERS' RESPONSIBILITY FOR SCIENCE IN THE PRESCHOOL

RATIONALE

Science is all around us; thus, the teacher of young children must develop an awareness of the learning opportunities available for developing science concepts in children. Science experiences are both planned and incidental; however, the alert teacher will follow both with reinforcing activities.

It is the teacher's responsibility to become acquainted with the many aspects of science. In this way the curriculum will be broadened, and the children will be encouraged to explore, observe, and experiment to solve problems and new situations.

ESSENTIAL CONTENT INFORMATION

I. Objectives in Teaching Science to the Young Child.*

The teacher needs to keep these objects in mind for teaching science to preschool children.

A. To develop in children the ability to solve problems through the use of scientific methods:

1. Capitalize on questions and the natural curiosity of children.

2. Help children say exactly what they want to find out.

3. Help children become aware of ways to find out. Call methods by name: Observing, experimenting, listening, etc.

4. Keep trying things together. (Ex. "What did we do yesterday to find out? Let's try it again.")

*Source: Leeper, Sarah, et al. Good Schools for Young Children. New York: Macmillan Publishing Company, 1974.

5. Name these experiences as science.

6. Encourage both sexes to participate.

7. GUIDE discovery to the correct conclusion without TELLING the child the answer.

8. Remember HOW it is discovered is as important as WHAT is discovered.

B. To develop in children a scientific attitude. Characteristics of this attitude are not jumping to conclusions, carefully weighing all sides of a problem, evaluating the source, not being closed minded.

C. To help children learn some subject matter. The academic matter can be overly-stressed in the preschool, but too often it is neglected.

1. Keep information at the children's level; however, do not underestimate their abilities or interests.

2. Plan and intend to have children learn some science concepts.

3. Help children recall and relate information---to put ideas together.

4. Record concepts children have learned. Use this to further their learning.

D. To develop in children an awareness, interest, and an appreciation in the world around them.

1. Build upon present interests of children.

2. Plan for success and "fun" in their experiences so that interest will grow.

3. Encourage children to discuss, listen, think, evaluate, observe, manipulate and wonder.

4. Present questions, materials, and/or problems that open new interests for children.

5. Be interested! Enthusiasm is contagious! Children respond to someone who is interested in science themselves.

II. Knowledge Needed for an Effective Science Program.

A. How children learn:

1. Children learn through their senses. They learn to observe, discriminate, describe, and to compare from information gained through their senses.

a. Sight: long, longer, longest; big-little; high-low, etc.

b. Hear: quiet-noisy; bell sounds; shaking sounds, music, etc.

c. Taste: sweet, sour, salty, bitter.

d. Smell: Every object has its own scent. Some scents are pleasant, some are not. Objects may be identified by their odor: musty, sweet, etc.

e. Touch: hard-soft, smooth-rough, warm-cold, etc.

2. Preschool children need a great variety of experiences. Because they have had little experience, nothing is too basic for them to explore. Children need to be involved with real things; science experiences can meet those needs. REAL shells, REAL rocks, REAL cookie dough, REAL grass, REAL puppies---all need to be seen, listened to, smelled, touched, and some even tasted. Natural phenomena like snow, wind, rain, temperature need to be experienced. Therefore, provide first hand experiences with real objects and real problem-solving materials for the children to manipulate and to explore.

B. Basic Areas of Science:

1. Physical Science.

   a. Matter and energy.

   b. Our earth and the universe.

   c. People and their environment.

2. Biological Science.

   a. Plants.

   b. Animals.

   c. Human body.

C. Key Concepts of Science:

1. Change: The universe is constantly changing.

2. Space: The universe is very large.

3. Time: The universe is very old.

4. Adaptation: Life is constantly adapting to the environment.

5. Variety: People are different. Many varieties of plants exist.

6. Interdependence of living things: All forms of life compliment each other: they help maintain balance in our universe.

7. Energy: Energy is involved in all motion; change is energy.

D. Teaching Science to Preschool Children:

1. Assist children to inquire and answer their questions.

   a. Guiding children's thinking through skillful use of questions is important.

      (1) For clarification: "How would that work?"

      (2) For direction attention: "Have you noticed that. . . ?" or, "This is puzzling; how do you suppose. . . ?"

      (3) For stimulating thought and speculation: "Have you ever wondered about. . . ?" or "Have you thought of it this way?"

   b. Ask questions so they are answerable for children, or will lead them to find the answer.
   DO: "When you jump up, do you always come down?" (Child can answer)
   DO NOT: "What makes you go down when you jump up?" (Child cannot answer)

   c. Answers should be given after the child has had time to speculate and explore. Avoid giving answers too readily.

   d. DISCOVER WHAT THE CHILD IS THINKING, and take it from there.

2. Help find the answer.

   a. Through observation, experimentation or research.

   b. Through the use of the scientific method of problem solving:

      (1) Initiate curiosity.

      (2) Identify problem.

(3) Hypothesize: Speculate what the answer might be.

(4) Plan experiment: Suggest what we might do to find out.

(5) Identify results: Observe and interpret your discoveries and draw conclusions.

(6) Predict: Suggest what would happen if experiment were repeated.

(7) Explore other possibilities:

a. Other ways of testing by hypothesis.

b. Other things to experiment.

E. Plan the Science Curriculum:

1. Children's interests are important in planning the science curriculum, but a dependence on them for total program development often results in content gaps.

a. Children do not always express interest.

b. Children cannot easily express ideas in areas which they know nothing.

2. Develop basic concepts for curriculum.

a. Build concepts around areas of science.

(1) Living things.

(2) Matter and energy.

(3) Earth and universe.

(4) People and their environment.

b. Integrate science learnings with other experiences.

c. Build concepts from the "bottom up."

d. KEEP ON THE CHILDREN'S LEVEL.

(1) Keep wording simple.

(2) Keep concepts simple.

e. Offer variety and balance in the activities in which the children will participate.

(1) Field trips.

(2) Experiments.

(3) Educational media.

(4) Observations.

(5) Resource people.

f. Offer several different activities to teach the same concept. Children learn through repetition.

CHAPTER V

TEACHING SCIENCE IN THE PRESCHOOL

RATIONALE

Opportunities for learning and teaching science to preschool children can be found in almost every preschool center. The teacher who takes advantage of these opportunities can provide children with experiences in exploring, experimenting, questioning, problem solving and developing an awareness of their relationship to the world around them.

ESSENTIAL CONTENT INFORMATION

I. Biological Science---Areas and Concepts.

A. Human Body:

1. Each person has special characteristics. (self-concept)
2. Our bodies have many likenesses and differences.
3. Each part of our bodies has a special function.
4. We learn through our senses.
5. Boys' and girls' bodies are different in some ways.
6. Our bodies need proper care and diet in order to function correctly.

B. Plants and Animals:

1. Living things have biological needs.
   a. ANIMALS need food, shelter, protection.
   b. PLANTS are living things. Like animals, they need air, food, sunlight, water, and protection.

2. Many different kinds of animals and plants exist.

   a. ANIMALS differ in color, size, shape, coverings, number of legs or appendages, actions or locomotions, voice or noise, and other features.

   b. PLANTS differ in size, shape, type, plant structure, and other features.

3. Animals and plants have many kinds of habitats.

   a. ANIMALS have many different kinds of homes.

   b. PLANTS grow in many types of soil, warmth and moisture.

4. Living things grow and have life cycles.

   a. ANIMALS grow in many ways. (life cycle of frog, dogs, and other animals)

   b. PLANTS grow in many ways. (life span, blossoming, being dormant)

5. Living things reproduce their own kind.

   a. ANIMALS give birth to babies, but some lay eggs.

   b. PLANTS reproduce by seeds, runners, bulbs, etc.

6. Living things depend on each other.

   a. ANIMALS depend on plants and other animals for food.

   b. PLANTS depend on animals for CO_2 and fertilizer.

II. Presenting Biological Science Concepts.

As we have seen, biological science is all around us. Therefore, if subject matter is available, we can readily take advantage of it. The subject of biological science is an academic one. However, we can incorporate biological science learnings into our classroom without becoming too technical in our approach.

A. How to Develop Basic Concepts in Biological Science:

1. Select a major area of biological science. (Ex. Animals)
2. Select a topic in that area. (Ex. Horses)
3. List key science concepts related to the topic which will help the child gain a better understanding.
4. Organize materials for effective classroom use.

B. Biological Science Learning Experience:

1. Constructing a terrarium.
2. Going on a nature walk.
3. Planting a garden.
4. Caring for a pet.
5. Watching guppies grow.
6. Smelling different scents.
7. Snapping beans.
8. Hatching baby chicks.
9. Burying a dead bird.
10. Peeling carrots.
11. Observing roots from plants.

12. Watching yeast in action.

13. Observing mold growth.

14. Growing plants without soils.

15. Finding bones and fossils.

16. Looking at pictures of the human system.

C. Materials and Techniques to teach Biological Science:

1. Field trips.

2. Books on biological science.

3. Songs on biological science.

4. Poems and fingerplays on biological science.

5. Records on biological science.

6. Community resources such as farms, zoos, hatcheries, nurseries, and others.

7. Special projects (such as aquariums, terrariums)

8. Observations of living things.

III. Physical Science---Areas and Concepts.

A. Matter and Energy:

1. Matter.

a. Solids, liquids and gases are the three forms of matter.

b. Air is a gas. It is all around us and fills space.

c. Water, milk and juice are examples of liquids.

d. Dirt and sand are solids.

e. Vibrating matter produces sound.

2. Energy.

a. Energy exists in many forms and is used to change or form the earth's resources.

b. Fuel supplies energy for engines. Examples of fuel are coal and gasoline.

B. Earth and Universe:

1. Weather: clouds, sunshine, wind, lightening, thunder.

2. Precipitation: rain, snow, sleet, hail.

3. Seasons: spring, summer, fall, winter.

4. Earth surface: soil, rocks, water, minerals, erosion, gravity.

5. Geography: maps, different terrains, etc.

6. Constellations: moon, sun, stars, and planets.

C. People and Their Environment:

1. People use animals for pleasure, for food, and for clothing.

2. They use and control light.

3. They use machines to help them.

4. They use energy to ease their work.

IV. Presenting Physical Science Concepts.

As we have seen, physical science is all around us. Therefore, if this subject matter is available, we can readily take advantage of it. The subject of physical science is an academic one. However, we can incorporate physical science learnings into our classroom without becoming too technical in our approach.

A. How to Develop Basic Concepts in Physical Science:

1. Select a major area of physical science. (Ex. earth and the universe)

2. Select a topic in that area. (Ex. winter)

3. List key concepts of physical science which will help the child gain a better understanding.

4. Organize materials for effective classroom use.

B. Materials and Techniques to Teach Physical Science:

1. Field trips.

2. Books on physical science.

3. Songs on physical science.

4. Poems and fingerplays on physical science.

5. Records on physical science.

6. Community resources such as farms, newspaper office, fire station, etc.

7. Special projects (such as magnets, etc).

8. Experiments.

V. Experiments.

Experiments are planned to test, to try out ideas, and/or to help children come to accurate conclusions. The steps for conducting an experiment with young children are as follows:

A. State the problem of the experiment in order that children know what they are trying to find out.

B. Decide what is to be done to solve the problem or answer the question.

C. Get the materials needed and organize them.

D. Do the activities agreed upon, encouraging the children to participate when feasible.

E. Observe carefully what happens and write down in simple idea form.

F. Answer the questions.

VI. Physical Science Learning Experiences.

A. Performing simple experiments:

1. Dissolving sugar in water.

2. Watching ice melt.

3. Making ice cream.

4. Watching water boil.

5. Cooking an egg with the sun.

6. Making gelatin.

7. Cooking pudding and other simple foods.

B. Observing reflections of objects at different times in the day.

C. Sawing and using woodworking materials.

D. Floating objects of different sizes, shapes, and weights in a tub of water.

E. Listening to many sounds and identifying their sources.

F. Discovering what makes shadows by using flashlight.

G. Watching wood burn in a bonfire, and cooking simple foods over an open fire.

H. Exploring nature and identifying different types of rocks and fossils.

I. Collecting rain samples.

J. Constructing wind detectors.

K. Observing and identifying types of clouds.

L. Comparing weights of many objects of different sizes and shapes.

M. Observing heat friction from rubbing rocks together.

N. Using a magnet with various objects.

CHAPTER VI

ACTIVITY DEVELOPMENT

RATIONALE

Activities for young children must be organized to be effective and require evaluation to determine their effectiveness. Through the use of an activity file card system the individual teacher can better organize his/her time to meet the individual needs of children.

When activity plans are written in a uniform fashion a volunteer, substitute, or aide can become familiar with what is being done. In addition, the file cards provide a useful reference for future teaching of young children.

ESSENTIAL CONTENT INFORMATION

I. Components of an Activity Card.

A. Curriculum Area: e.g., Science.

B. Topic: The theme or area of study, e.g., Plants.

C. Teacher Goal: The overall purpose of the learning activity.

D. Performance Objective: The behavior(s) that the child should be able to perform upon completion of the activity.

E. Materials: A listing of all the items needed for carrying out the activity.

F. Procedure: A sequential listing of all the steps involved in carrying out the activity.

G. Evaluation: A critique of the activity to see whether the performance objectives were accomplished. The evaluation would also include statements useful for future reference about how the activity could be improved, appropriateness to this group level, etc.

II. Setting Up the Activity Card File.

A. A Suggested Curriculum Division.

1. Art.
2. Body Skills.
3. Family.
4. Health.
5. Language.
6. Mathematics.
7. Music.
8. Nutrition.
9. Play.
10. Safety.
11. Science.
12. Self-Concept.
13. Social Science.

B. Procedures for Developing the Activity Card File.

1. Obtain a 5" x 8" file box and file cards.
2. Divide the file into your chosen curriculum divisions.
3. Develop learning activities for each curriculum division to carry out your yearly and weekly program plans.

III. Activity File Card.

Reduced Sample:

Curriculum Area
(Topic)

Teacher Goal:

Objective(s):

Materials:

Procedures:

Evaluation:

SAMPLE ACTIVITY FILE CARD - SCIENCE

Curriculum Area
Science
Zoology Identification

Teacher Goal: Difference in appearance of insects and mammals for identification.

Objective(s): After looking at pictures of insects and mammals, each child will be able to name which group each picture fits into and name one physical characteristic of the group.

Materials: Five pictures of mammals and five pictures of insects.

Procedure: Show each picture; children name the animal; teacher repeats name, identifies class-insect or mammal. Have children compare one mammal and one insect and tell difference in appearance. Repeat for all pictures. Summarize characteristics of groups. Show pictures to name and identify class.

Evaluation: Use animal and bug to further identify mammal and insect. Repeat for further understanding.

CHAPTER VII

LEARNING ACTIVITIES

RESOURCE UNIT DEVELOPMENT

Develop a file of five (5) resource units for teaching various concepts of science. These units should be written on 5" x 8" cards for use with the activity file cards which specify the information for teaching the concepts.

Each resource unit will include the "Resource Unit Card" and "Activity File Cards" for teaching the concept. (Use the standard "Resource Unit Card" and the standard "Activity File Card" developed for the CDA program.)

TO BE TURNED IN:

Duplicates of the five "Resource Unit Cards."

NOTE: Activity File Cards to teach the concepts listed on the "Resource Unit Cards" should be developed, but are not to be turned in as a part of this assignment.

RESOURCE UNIT CARD

(Reduced Sample)

Learning Center:			Curriculum Area:		
Concept	Books, Stories, Films	Poems, Finger-plays	Songs, Rhythms, Records	Dramatic Play Themes	Outdoor Activities

(Reverse Side)

Learning Center:			Curriculum Area:		
Concept	Art Activities	Field Trips	Cooking Experiences	Community Visitors	Other

SCIENCE RESOURCES INVENTORY

Take an inventory of the materials that you presently have in your room that can be used in the child's learning of science concepts. Write down at least ten of these. Then do the following with each of the ten items:

1. State the science concept that a child could learn with that item.

2. Briefly describe the way in which the item could be used (by the teacher or the child) for learning that science concept.

The format for this assignment is illustrated on the following page.

TO BE TURNED IN:

Your completed inventory form.

Material	Concept to be Learned	How the Item Will be Used for Learning

Learning Activity #2 (Continued)

RESOURCE INVENTORY ADDITIONS

Refer to Learning Activity #2: Science Resource Inventory. Think of other materials that could be added to expand your science center, and write these down on the attached form.

Select ten of these items, and write beside each the science concept that could be taught and the way the item could be used for learning that concept.

TO BE TURNED IN:

Your completed Inventory Additions Form.

Material to be Added	Concept to be Learned	How the Item Will be Used for Learning

Learning Activity #3
(Continued)

LEARNING CENTER - SCIENCE

Evaluate the learning center for science in your classroom according to the criteria listed on the attached form. If the center is not currently being used, evaluate it when it is in operation.

To complete the assignment, refer to the qualities found in a good learning center and your resource inventory.

TO BE TURNED IN:

The completed evaluation form of the learning center.

OBSERVATION GUIDE FOR LEARNING CENTERS

I. Interest Centers (general)

A. List the interest centers you see.
B. Are they easily identified? How?
C. Are the quiet centers separated away from the noisy areas?
D. Are they attractive and inviting?
E. Which has attracted the most children? Fewest?

II. Materials and Equipment

A. Is there a good variety?
B. Are materials available to the children?
C. Are they appropriate to the development needs of the children?

III. Pupil-Teacher Interaction

A. What is the pupil-teacher ratio?
B. Do the children behave well when the teacher is looking and badly when the teacher is not watching? Which ones?
C. Does the teacher ever physically express affection for the children?
D. Are concern and understanding expressed for the overly-aggressive child? Tell about it.
E. Are there any "loners" among the children? Who? Can you explain their behavior? Do you notice any adult interaction with these children?
F. Look for positive guidance techniques which are used.
G. How are transition times handled?

1. Is there an advance notice given?
2. Were the children lined up or did they move naturally under supervision?
3. How were the slower children handled?

IV. Science Learning Center

A. What learning centers are available?
B. Is there a science center?
C. Is it arranged as a distinct learning center within the environment?
D. Is it together or separate from similar areas?
E. Are there materials available for experiences in the science center?
F. Is the center arranged to allow the child to explore independently?
G. Is the center attractive and inviting?
H. Is there anything in it that could serve to stimulate curiosity?
I. Are there currently science experiences for self-selected activities?
J. Are there currently-planned science experiences for group activities?
K. List all the equipment that you see in the science center. Are many children attracted to it? Can you suggest any additions or improvements?

V. Physical Setting

A. Draw a diagram of the room, locating all learning centers. Specifically note the placement of the science center.

B. What changes could be made in the room to improve the physical arrangement and utilization of the science center? Be specific.

ACTIVITY FILE CARDS

Develop at least five (5) activities for children in science. Use the uniform activity file card developed by the CDA program for writing up your activities.

(Reduced Sample Card)

Curriculum Area (Topic)
Teacher Goal:
Objective(s):
Materials:
Procedures:
Evaluation:

TO BE TURNED IN:

Duplicates of the five activity cards, after the activities have been presented.

CONSTRUCTION OF VISUAL AIDS

A. Instructions

1. Construct a visual aid for science.

2. The visual aid will be used for teaching a concept from one of the activity file cards that you developed for Learning Activity #5.

B. Evaluation

After your visual aid has been used, evaluate it according to the following:

a. Effectiveness in teaching the stated goal and concepts for the content area, according to your activity file cards.

b. Attractiveness, durability, originality.

TO BE TURNED IN:

1. A neatly-written description and sketch of the visual aid.

2. A neatly-written description of your evaluation of the visual aid.

COMMUNITY VISITOR - SCIENCE

Invite a person in a science profession from your community to come to your center to talk about or teach some aspect of science. This person could be a laboratory technician, photographer, agronomist, etc.

EVALUATION:

After the person has talked to your class, evaluate the effectiveness of the presentation according to the following:

1. Did the theme of the science professional's visit fit into your program for the week?

2. Did you prepare the children well enough beforehand so that they benefitted from the visit?

3. Did you prepare the professional for the visit so that he/she was able to communicate well with the children?

4. Give an example of one child's behavior which showed that he/she learned something from the guest.

5. Could you have done anything differently in preparing for your guest that would have made the visit more effective for the children?

6. What follow-up activities have you done to reinforce the principles or concepts presented by the visitor?

TO BE TURNED IN:

A written evaluation of the visit of a science professional to your classroom, which includes items 1 through 6 of Evaluation, plus any other important information.

PLANNING AND CONDUCTING A FIELD TRIP FOR YOUNG CHILDREN

All students are to plan and conduct a field trip for the various groups of preschool children by completing the following steps:

A. Select and plan a field trip appropriate for your group of preschool children, according to the criteria given for their learning of science concepts.

B. Write a report, in outline form, describing what you did for each step.

C. Fill out the safety checklist (attached).

D. Discuss, in a short paragraph, how your planning for the trip could have been improved.

TO BE TURNED IN:

1. A report, in outline form, on a field trip which you actually conducted with your children.

2. A short paragraph describing how your planning could have been improved.

3. Safety checklist.

HOW TO PLAN A FIELD TRIP

1. Decide on the purpose of the field trip (in this case, the children's learning of science concepts), and decide whether this is the best way for achieving your learning goal. Among the general questions to ask yourself in regard to a field trip are the following:

   a. Is the length of time required appropriate for the age of the children? Will their routines of eating and sleeping be disturbed? Will they become overtired?

   b. Are the learning experiences to be gained appropriate for the age of the children?

   c. Is this an experience that the children have already had with their parents?

   d. Is the security of any child going to be threatened by leaving school with a stranger who might be helping with the field trip?

2. When a field trip is decided upon as an effective way for helping the children learn certain concepts or gain specific understandings, then list and clarify the objectives for the trip.

3. Select appropriate destination.

4. Obtain administrative approval. Investigate and observe school policies.

5. Contact the place to be visited. Get the name of your contact and discuss the following:

   a. Date
   b. Time of arrival
   c. Duration of trip
   d. Size of group (number of children and adults)
   e. Purpose of trip

6. Make a preliminary visit to gain a better understanding of what the location has to offer. Checklist for preliminary trip:

   a. Anticipate safety hazards
   b. Outline itinerary
   c. Obtain available materials (brochures, literature or pictures)
   d. Determine whether the site fulfills the purposes of the trip
   e. Make detailed plans

7. Confirm the trip by letter or telephone.

8. Obtain written permission from parents. Use forms which state that you will take every reasonable precaution to safeguard the child, but should any unavoidable accident occur, the parent will not hold you or the center responsible. Also, include the following information in "A letter to the parents":

   a. Date
   b. Time
   c. Destination
   d. Means of transportation
   e. The need for money, snack or sack lunch
   f. Appropriate clothing

9. Plan with the children. Tell them beforehand about the trip. This depends on the age of the children and how "big" or important the trip is. Yet never announce it more than two (2) weeks ahead, even for five-year-olds. Stimulate their curiosity by asking open-ended questions, showing appropriate pictures, posters or objects. Draw out questions from them on what they would like to find out. If you use a calendar with the children, let them mark it to indicate the day of the trip. Every day let the children count up to see how many more days until the trip.

10. Arrange transportation. If private cars are used, be sure that the parents have adequate liability insurance. Arrange to have two adults in each car, with one in the back seat. If the children are walking, the number of adults will vary according to the children's ages--with three-year-olds, one adult to two children; with four- and five-year-olds, one adult to four children.

11. Plan again with the children before departure. Use the following checklist:

    a. Dress (button-up, shoes tied)
    b. Name tags (if used)
    c. Behavior on bus or in cars
    d. Courtesy while there
    e. Safety rules
    f. Everyone go to the bathroom

12. After the trip:

    a. Make sure parents sign volunteer sheet.
    b. Talk about the trip with the children.
    c. Plan and execute follow-up activities.
    d. Make your own evaluation of the trip.

        1. Were questions (formulated before the trip) answered?
        2. Were there other questions that could have been asked, but were not?
        3. Did the trip meet your objectives?

    e. Write thank-you letter to the host.

SAFETY CHECKLIST FOR TEACHERS PLANNING AN EXCURSION

		YES	NO
1.	Did you plan the trip carefully with the class and with all adults accompanying the children?	____	____
2.	Did you make arrangements for the children to get to their homes safely if the trip should extend longer than planned?	____	____
3.	Are the drivers licensed, competent and insured? Are the vehicles in good condition and insured?	____	____
4.	Did you instruct the children about their conduct in a vehicle? (No moving around once vehicle starts, no hands or arms out windows, no throwing things out windows, remaining in seats.)	____	____
5.	Do children have proper means of identification? (Badge, ribbon, I.D. card, buddy system, group leader, patrols.)	____	____
6.	Do you plan a roll call at various times during the trip?	____	____
7.	Do you have enough adults to supervise the group?	____	____
8.	Do you have a first aid kit with you, and a person trained in administering first aid?	____	____
9.	Did you double check to make sure all pupils going on the trip have signed permission slips on file?	____	____
10.	Did you inform your children to dress for the occasion and for the weather?	____	____
11.	Will there be sufficient time to make the return trip during normal attendance time?	____	____

		YES	NO
12.	Did you make it clear to the group ahead of time that if anyone should be separated from the group, all should meet at a certain time and at a designated place?	____	____
13.	Have you made it clear that you will not permit undesirable behavior during the trip?	____	____
14.	Do you know what to do in event of accident or illness while on the trip?	____	____
15.	Have you checked loading and unloading areas?	____	____
16.	Has special provision been made for handicapped pupils?	____	____
17.	Have pupils made a code of safety for use on field trips?	____	____
18.	Have you planned an evaluation of the trip from the standpoint of safety?	____	____

MEETING INDIVIDUAL NEEDS THROUGH SCIENCE

Science activities have many purposes. It is the teacher's responsibility to develop and make available a variety of creative experiences to meet individual needs of children.

On the attached form, list the type activity, the need to be met, and the reason for selecting the activity for each type of child.

TO BE TURNED IN:

Your completed form.

Type Child	Activity	Need Met	Reason
Meticulous (concerned with staying clean)			
Withdrawn			
Non-Verbal			
Aggressive, Over-Active			
Skilled in Fine Motor Development			
Skilled in Large Motor Development			
Unskilled in Fine Motor Development			
Unskilled in Large Motor Development			

Learning Activity #9
(Continued)

VALUES OF ACTIVITIES

Evaluate the five activities you completed in Learning Activity #5 according to the attached form.

TO BE TURNED IN:

Five completed forms on the activities.

VALUES OF ACTIVITIES

Activity Observed:_____

1. Of what value was this experience for the total development of the child? CHECK ONLY THOSE VALUES THAT THIS ACTIVITY WOULD PROVIDE FOR THE CHILD.

a.	Sensory experience	_____
b.	Exploration	_____
c.	Satisfaction and enjoyment	_____
d.	Self-expression	_____
e.	Manipulation	_____
f.	Emotional release	_____
g.	Exercise imagination and initiative	_____
h.	Good work habits	_____
i.	Learning experience	_____
j.	Skill and concentration	_____
k.	Eye-hand coordination	_____
l.	Harmony, rhythm and balance	_____
m.	Insight into own feelings	_____
n.	Development of large muscles	_____
o.	Development of small muscles	_____

2. Can you think of any other values that this activity could provide for young children? Please list.

3. For what age level do you think this activity is most appropriate? Why?

4. What variations of this activity could you use in your classroom? Please describe two.

   a.

   b.

EVALUATION OF

SCIENCE ACTIVITIES IN THE PROGRAM

Visit a child development or day care center and observe its activities relating to science. Evaluate what you observed according to the questions on the attached form.

TO BE TURNED IN:

Your completed form.

SCIENCE ACTIVITIES IN THE PROGRAM

EVALUATION

1. Did the science activities fit into the daily schedule in terms of active and quiet periods?

2. Did the activities involve the entire class, two or three small groups, one small group, or individual children only?

3. Were the children motivated? That is, did the teacher arouse their interest first?

4. Did each activity appear to be suitable to the developmental level of each child?

5. Did the teacher give needed help (as with how to handle tools), or enough structure to the activity, but not to the extent of unduly restricting creative expression?

6. Did the teacher use any direct guidance? Was it verbal or physical?

7. Did the teacher use any reinforcement techniques? Give exact quote.

8. Did the children appear to enjoy the activity?

9. Were they being creative? What evidence was there?

10. Were the children given an opportunity for exploration with the science medium?

11. Did the children appear to be getting satisfaction and enjoyment from this activity?

12. What other benefits can you name from this learning activity?

STORIES FOR SCIENCE

Select three children's stories which contain science concepts. Read these stories to your class and evaluate each one according to the following evaluation form.

TO BE TURNED IN:

Your completed evaluation forms.

EVALUATION

CHILDREN'S BOOKS

TITLE:
AUTHOR:
CONCEPT:

	Fair	Good	Excellent
Was it interesting?			
Was its length appropriate (5 to 15 minutes)?			
Were the pictures simple and appealing?			
How well did it teach the concept?			

Your comments:

SCENT CONCEPTS

Construct a set of materials for a "smelling party" to develop concepts of scent.

Use small bottles, such as pill bottles with lids. Saturate cotton balls with substances of various odors and place each one in a bottle and cover.

Demonstrate and have the children smell the different scents in each bottle.

Discuss scent and the use of smell in daily living, as well as what each bottle smells like.

TO BE TURNED IN:

An evaluation of the activity, including questions asked and the concepts learned.

"FEELY" BOX OR BAG

Cut a hole in the side of a box which has a cover. Attach the top of an old sock to this hole through which the children will put their hands. Decorate the box and label it "Feel" Box.

Inside the box place various small objects for the children to feel, describe and name, after they put their hands in the box and touch an object.

Instead of a box, you may wish to use a bag with a drawstring top to hold the objects.

TO BE TURNED IN:

1. A description and sketch of the box or bag.
2. An evaluation of its use.
3. A list of objects used at various times.

CONSTRUCTING A TERRARIUM

I. Value of a Terrarium in the Classroom:

A. A terrarium provides unlimited opportunities for teaching young children first hand about their world. Through observation, children learn concepts of science, such as the following:

1. Change - The universe is constantly changing (notice plant growth).
2. Adaptation - Life is constantly adapting to the environment.
3. Variety - People, plants and animals are different (notice the variety of plant and animal life).
4. Interdependence of living things - Life complements life; it helps maintain balance in our universe (notice that frogs eat flies and breathe the oxygen of plants).

B. A terrarium is a practical item to include in the classroom.

1. Equipment is easily obtainable and inexpensive to make.
2. Children can become involved by experience in helping to care for the living things.

II. Planning a Terrarium with Young Children:

Like any other science experience, the terrarium should be a planned experience with a purpose in mind. An example of how to stimulate interest in this activity might be to go on a nature walk.

A. Objective:

To increase the children's awareness that there are many kinds of plants.

B. Materials needed:

1. Suggested: paper bags, digging spoon, magnifying glass.
2. Materials for follow-up activities, including those to set up a terrarium.

II. (Continued)

C. Preparation for walk (plan with the children):

1. Experiences with a variety of plants.
2. Discussion of walk: safety rules and "what we may find."

D. Activity on walk:

1. Explore different kinds of vegetation and note:

a. parts of (note leaves, bark, berries, etc.)
b. different kinds of
c. habitat
d. soil

2. Collect examples of different kinds of vegetation. Remember: All vegetation should be collected from similar environments (either aquatic, semi-aquatic or woodland, etc.).

E. Follow-through activities:

1. Make a terrarium; help the children set up an environment similar to that from which the plants were collected.
2. Display different kinds of plants from the nature walk.
3. Arrange for the children to grow different kinds of plants in or out of the center, according to the season.

III. Construct a Terrarium with the Children by Completing the Following Steps:

A. Collect necessary materials:

1. Rectangular, spherical, flattened spheres or cylindrical (in fact, almost any shape) containers with covers
2. Gravel
3. Sand
4. Water
5. Aquatic and terrestrial plants and animals
6. Soil mixture suitable for woodland and bog habitats
7. Large spoon
8. Newspapers on which to work

III. (Continued)

B. Collect plants

Go on a nature walk with the children. Plants from the greenhouse are costly, as well as rather limited in providing learning experiences about the natural environments in which they grow. These are not acceptable for this project.

C. Construct the terrarium with the children, using the following steps:

1. Prepare the container. Wash and polish it so it will sparkle.
2. Cover the bottom of the container with one (1) inch of sand or charcoal.
3. Place one (1) inch of gravel or coarse pebbles on top of the sand.
4. If desired, a lining of moss, green side out, between the soil and the glass, is attractive.
5. Cover the moss with about one and one-half inches of humus. If available, sphagnum or peat moss should be mixed with the humus. Soil should not be so rich, however, that your plants will rapidly outgrow their rather limited space.
6. Landscape the soil. In doing this, the appropriate depths should be maintained.
7. Arrange the plants and anchor them in upright positions.

    a. arrangement should approximate the plants' natural environments (shade plants should be in a shaded area, etc.)
    b. arrange the plants for maximum display value (larger plants in back and smaller ones forward, etc.)

8. Cover the soil with a layer of moss, orchid bark chips or stone chips.
9. Put decorative rocks, stones, twigs or figurines in place.
10. Water the terrarium. It should be kept moist, but not to the point that water saturates the sand layer. Leave the terrarium uncovered for a few days until the plants "take hold."
11. Add animals, if desired.
12. Place the terrarium in a position so that it will benefit from light. It need not be in direct sunlight more than two or three hours each day.

III. (Continued)

C. 13. Cover with glass or a fitted screen, depending on whether or not there are animals present.

14. Minimize sudden temperature changes. Do not place the terrarium too near a radiator.

15. Fertilizing the soil is not usually necessary. Pruning and snipping of the plants should be done whenever necessary to maintain the shape of the plants or to stimulate new shoots for attractive growth. Plant clippings can be rooted in a tiny terrarium (mayonnaise jar, for example).

IV. Types of Terraria:

A. Woodland

1. This type is for hardy perennial flowering plants, such as various kinds of mosses, ferns and evergreens.
2. Animals for this type of terraria would include snails, salamanders, toads, earthworms, etc.
3. Woodland terraria should not be watered too often and should be kept away from direct sunlight.

B. Semi-Aquatic

For bog and muck-loving plants which require more moisture than woodland plants.

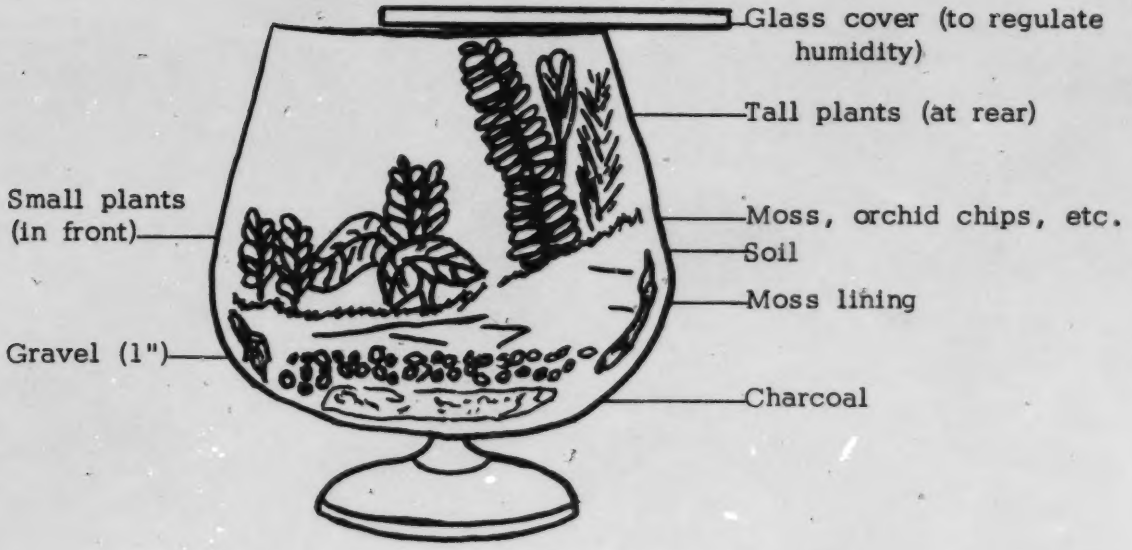
1. Cover the bottom of the container with gravel, as in the woodland terraria, but place sand over half the gravel, and build up the other side with soil. Water added makes a pool on the gravel and sand side into which aquatic plants can be introduced, as in an aquarium.
2. The soil-filled side can be covered with sphagnum moss and planted with sundew, venus fly-trap, tree seedlings, cranberry, twin-flower, partridge berry and/or bog laurel.
3. Snails, toads, turtles and earthworms may be used in a semi-aquatic terrarium.
4. Semi-aquatic terraria should be kept cool and away from direct sunlight.

IV. (Continued)

C. Desert

1. This type is for plants of the cactus, yucca and agave families.
2. Toads, collared lizards, chameleons and snakes are the natural animals for this habitat, but must be supplied with a shallow dish of water.
3. Desert terraria must not be over-watered.

V. Sample Terrarium Sketch:



TO BE TURNED IN:

A written description and evaluation of the terrarium made by the children.

1. Discuss the children's experiences, and the concepts learned during each of the following steps:

   A. Collection of the materials on a nature walk.

   B. Construction of the terrarium.

   C. Growth of the plants in the terrarium.

2. Was this an effective science learning experience? Describe why or why not.

CHAPTER VIII

SUPPLEMENTAL MATERIALS

SCIENCE

SUPPLEMENTAL MATERIALS

BOOKS - REFERENCE

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3615 Wisconsin Avenue N. W.
Washington, D. C. 20016

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Jenkintown, Pennsylvania 19046

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   Kranzer, Herman.

Bank Street Publications
69 Bank Street
New York, New York 10014

3. Firsthand Experiences and Sensory Learning.

4. Science Experiences in Early Childhood Education.

Early Childhood Education Council of New York City
51 West 4th Street
New York, New York 10000

5. Toward Science.

Los Angeles' Unified School District
Volunteer and Tutorial Program
450 North Grand, Room G-114
Los Angeles, California 90012

6. How Can I Help Children Investigate Science?
   $2.00

National Association for the Education of Young Children
1834 Connecticut Avenue N. W.
Washington, D. C. 20036

7. Books in the Preschool.
   (#121)
   $2.00

8. The Idea Box.
   (Set of 5 Booklets)
   $5.75

9. Water, Sand and Mud as Play Materials.
   Friedman, David B. and Dorothy Colodny.

National Association for Nursery Education
1834 Connecticut Avenue N. W.
Washington, D. C. 20036

10. Science Experiences for Nursery School Children.

National Education Association
1201 16th Street N. W.
Washington, D. C. 20036

11. How to Help Your Child Learn.
    $1.50

Teachers College Press
Columbia University
1234 Amsterdam Avenue
New York, New York 10000

12. Science Experiences for Young Children.
    Althouse, Rosemary and Cecil Main.
    $15.00/set
    This is a set of ten booklets on food, wheels, pets, water, magnets, colors, air, senses, seeds and growing.

AUDIO-VISUAL RESOURCES

FILMS

Contemporary Films
McGraw-Hill
1212 Avenue of the Americas
New York, New York 10019

1. I Have an Egg. Purchace: $110.00
   B/W, 14 minutes.
   This film deals with sensory perception and training of blind children; this is a good film for teachers of normal children.

EDC Film Library
Educational Development Center
55 Chapel Street
Newton, Massachusetts 02160

2. Vignette Series.
   The following short films allow close observation of science activities within a classroom setting.

   A. Marble Games. Rental: $10.00
      12 minutes.

   B. Water Play. Rental: $10.00
      12 minutes.

   C. Wall Washing. Rental: $10.00
      12 minutes.

Education Development Center
Distribution Center
39 Chapel Street
Newton, Massachusetts 02160

3. The Inquiring Mind. Rental: $10.00
Color, 8 minutes.
Stresses discovery learning and investigation in children, and shows the relationship between science activities of primary children and sophisticated research.

4. Let's Find Out. Rental: $15.00
Color, 15 minutes.
Shows primary children in Tanzania as they learn to observe insects and lizards during an outdoor activity period and then carry out experiments.

Modern Talking Picture Service
1411 Slocum Street
Dallas, Texas 75207

5. Water Play for Teaching Young Children. Free on loan.
Color, 17 minutes.
Water play is both an excellent sensory experience and a medium for learning through discovery and problem solving. Shows how teachers can use water play effectively.

New York University Film Library
26 Washington Place
New York, New York 10003

6. Zoo. Rental: $10.00
B/W, 32 minutes.
The story of a little boy of six and his experiences in a day at the zoo. When he returns home, he creates his own zoo collage.

Time-Life Films
43 West 16th Street
New York, New York 10011

7. Finding Out. Rental: $30.00
B/W, 30 minutes.
Shows application of scientific methodology in an activity situation.

CHILDREN'S BOOKS

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   Fossils Tell of Long Ago.
   New York: Thomas Y. Crowell, 1972.

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   My Five Senses.
   New York: Thomas Y. Crowell, 1962.

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   New York: Doubleday and Company, 1967.

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Air is All Around You.
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